What is claimed is:

1.   A loop interference canceller for canceling loop
interference between transmission/reception antennas
when multicarrier signals having reference carriers at
regular intervals are relayed at the same frequency for
transmission and reception, comprising:

a cancellation section that cancels loop
interference included in a received signal using a filter
for which a factor is set;

a transmission path characteristic estimation
section that estimates the transmission path
characteristic of a signal after said loop interference
is canceled;

a residual characteristic calculation section that
calculates a cancellation residual based on the
estimation result of said transmission path estimation
section;

a 0 insertion section that inserts 0 data for the
output of said residual characteristic calculation
section;

an inverse fast Fourier transform section that
transforms the output of said 0 insertion section into
a time domain signal;

a windowing section that ,with respect to the output
of said inverse fast Fourier transform section, extracts
either a range without the repetitive component of the

transmission path characteristic or a range specified

by the factor of said filter, whichever is smaller; and

an updating section that updates the factor of said

filter based on the output of said windowing section.

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2.   The loop interference canceller according to claim

1, wherein said transmission path characteristic

estimation section comprising:

a fast Fourier transform section that transforms

10   the output of said cancellation section which is a time

domain signal to a frequency domain signal;

a reference carrier information extraction section

that extracts information indicating arrangement of

reference carriers and signal components from the output

15   of said fast Fourier transform section;

a reference carrier extraction section that

extracts only reference carriers from the output of said

fast Fourier transform section according to the

arrangement of the reference carriers obtained from the

20   output of said reference carrier information extraction

section; and

a transmission path characteristic calculation

section that calculates the transmission path

characteristic of reference carriers by comparing the

25   output of said fast Fourier transform section with the

arrangement and signal component of the reference

carriers obtained from the output of said reference

carrier information extraction section.

3.   The loop interference canceller according to claim 2, wherein said transmission path characteristic estimation section estimates the transmission path characteristic using only one set of outputs of said transmission path characteristic calculation section.

4.   The loop interference canceller according to claim 2, wherein said transmission path characteristic estimation section further comprises a reference carrier combination section that stores a plurality of sets of outputs of said transmission path characteristic calculation section and combines the sets of stored outputs with different arrangements of reference carriers according to the arrangement of reference carriers obtained from the output of said reference carrier extraction section,

said reference carrier combination section combines only two sets of outputs in which reference carriers are arranged at regular intervals, and

the transmission path characteristic is estimated using the output of said reference carrier combination section.

5.   The loop interference canceller according to claim 2, wherein said transmission path characteristic

estimation section further comprises a reference carrier combination section that stores a plurality of sets of outputs of said transmission path characteristic calculation section and combines the sets of stored outputs with different arrangements of reference carriers according to the arrangement of reference carriers obtained from the output of said reference carrier extraction section,

said reference carriers combination section combines only four sets of outputs in which reference carriers are arranged at regular intervals, and

the transmission path characteristic is estimated using the output of said reference carrier combination section.

6. The loop interference canceller according to claim 1, wherein a specific set of reference carriers which do not require phase rotation compensation processing is used when the transmission path characteristic which is the output of said transmission path characteristic estimation section is estimated.

7. The loop interference canceller according to claim 1, further comprising a phase rotation compensation section that carries out phase rotation compensation according to the arrangement of carriers used to estimate said transmission path characteristic for the output of

said windowing section,

wherein said updating section generates a factor of said filter from the output of said phase rotation compensation section.

8. The loop interference canceller according to claim 4, wherein said reference carrier combination section changes the number of sets of outputs of said transmission path characteristic calculation section to combine at the time of starting or restarting or according to the state of the factor of said filter.

9. The loop interference canceller according to claim 5, wherein said reference carrier combination section changes the number of sets of outputs of said transmission path characteristic calculation section to combine at the time of starting or restarting or according to the state of the factor of said filter.

10. A relay system provided with the loop interference canceller according to claim 1.

11. A loop interference canceling method for canceling loop interference between transmission/reception antennas when multicarrier signals having reference carriers at regular intervals are relayed at the same frequency for transmission and reception, comprising:

a canceling step of canceling loop interference included in a received signal using a filter for which a factor is set;

a transmission path characteristic estimating step
5   of estimating the transmission path characteristic of a signal after said loop interference is canceled;

a residual characteristic calculating step of calculating a cancellation residual based on the estimation result of said transmission path estimating
10   step;

a 0 inserting step of inserting 0 data for the output result of said residual characteristic calculating step;

an inverse fast Fourier transforming step of transforming the output result of said 0 insertion step
15   into a time domain signal;

a windowing step of, with respect to the output of said inverse fast Fourier transform step, extracting either a range without the repetitive component of the transmission path characteristic or a range specified
20   by the factor of said filter, whichever is smaller; and

an updating step of updating the factor of said filter based on the output result of said windowing step.